

# IPSWICH MILLS DAM REMOVAL FEASIBILITY STUDY FACT SHEET



IPSWICH RIVER  
WATERSHED ASSOCIATION

## WHAT IS THE FEASIBILITY STUDY?

- A feasibility study is conducted for many dam removal projects to provide technical information and answer key questions to inform project management and decision-making.
- The study investigated the environmental, technical, logistical and economic factors surrounding the removal of the Ipswich Mills Dam.
- The study provides guidance for the Town of Ipswich to make informed decisions. The study does not include a decision-making component and the Town has not made any decision whether to keep or remove the dam.

## WHO CONDUCTED THE STUDY?

- The Town of Ipswich began the study in 2015; The MA Division of Ecological Restoration and the Ipswich River Watershed Association (IRWA) are assisting the Town with project management.
- The consultant team was comprised of: Horsley Witten Group - Project Lead; Inter-Fluve - River Modeling and Conceptual Design; SGH - Structural Engineering; PAL - Historical & Cultural Resources; Car Dee Corp. – Borings; and Pepperell Cove Marine - Underwater Test Pits.

### Funding was provided by:

- The National Fish and Wildlife Federation (NFWF) through a grant from the U.S. Department of the Interior, the MA Division of Ecological Restoration (DER), and the Massachusetts Environmental Trust (MET).

## GENERAL BENEFITS OF DAM REMOVAL

Under Massachusetts and Federal law, dam owners can be liable for damage caused by dam failure or dam related accidents.

**In general,** dam removal leads to:

### Restoration of:

- Habitat conditions and natural river processes by removing artificial ponded habitat and stagnant water upstream.
- Natural riverine and wetland conditions. Dam removal may result in changes to wetland types but rarely results in wetland loss. *Due to well-understood resource area benefits, dam removal is encouraged under the Wetlands Protection Act.*
- An important ecosystem for migratory fish populations, especially those that travel between the sea and fresh water during their life cycles such as river herring, shad, American eel, lamprey, rainbow smelt, and sea-run brook trout.
- Sediment transport inherent to healthy river systems and return of trapped micro-nutrients back to estuarine and ocean primary producers.

### Reduction in:

- Flooding upstream through restoration of floodplain storage capacity and reduced risk of catastrophic flooding downstream in the event of dam failure.
- Operation and maintenance costs for dam owners mandated to provide fish passage by the MA Division of Marine Fisheries.

### Increase in:

- Public safety; dams are ephemeral and subject to failure over time. Proactive dam removal and associated mitigation can permanently eliminate future risk to public and private infrastructure and alleviates dam owners from ongoing maintenance costs.
- Resilience to climate change for the built environment and natural communities.
- River dependent plant and animal communities.

**For additional information, please contact:**

KAITLYN SHAW, SCIENCE & RESTORATION PROGRAM MANAGER  
IPSWICH RIVER WATERSHED ASSOCIATION

KSHAW@IPSWICHRIVER.ORG  
978-412-8200

### REGIONAL BENEFITS

Healthy, connected rivers are more resilient rivers. Removal of the Ipswich Mills Dam:

- Would eliminate a “head of tide” dam, one of the most ecologically destructive type of dam, as they eliminate the ability for aquatic species to gradually transition between or avoid salt water.
- Prevent the mortality of many freshwater organisms that currently wash over the dam, since they cannot gradually transition to or avoid salt water.
- Provides high restoration value for removal as compared to other dams. This site ranks in the 90<sup>th</sup> percentile for dams across the state according to DER and ranks in the 95<sup>th</sup> percentile for coastal dams from Maine to Virginia according to The Nature Conservancy.
- Would enhance likelihood of diadromous fish passage. Although the dam currently has a fishway, fishways can be inefficient and increase predation. Certain species, such as shad, do not reliably use fishways.
- Would restore 49 miles of migratory fish habitat and restore ecological health of the river through restoring natural temperature and dissolved oxygen regimes.
- Should have positive cascading effects on the aquatic food chain and fish-eating fish in the Gulf of Maine such as Cod, Bluefish, Bluefin Tuna, and Striped Bass, as well as marine mammals, through the increase in habitat for migratory forage fish like river herring which serve as important prey species.
- Would enhance both migratory and predatory fish populations and contribute to biodiversity, and economic resiliency of nearby coastal communities.
- Would restore natural ecosystem function and improve important processes such as biogeochemical cycling, sediment supply, and flood capacity.

### CHANGES IN FLOODING AND HYDRAULICS

A total of 30 channel and bridge cross sections were surveyed throughout the entire area of potential impact which extends approximately 1,100 feet upstream of the railroad bridge to downstream through the “lower falls” located just downstream of the County St. Bridge.

- There is no risk to present or future public or private water supplies. Like most “run of the river” dams, the Ipswich Mills impoundment stores relatively little water so it does not have significant water storage potential.
- The study produced a detailed model and assessed impacts on upstream infrastructure and property that could be impacted.
- Removal would result in lower water levels above the dam, while water levels below the dam will remain the same. Choate Bridge currently is and will remain the primary flow restriction for large storm events.
- Removal could result in the conversion of the ponded area behind the dam into a tidal fresh river area which is one of the rarest wetland habitats in Massachusetts.
- The new water elevations would vary based on seasonal river flows and daily tides. Models predict the new water level will average elevation 3.5 feet and vary between 1 and 6 feet lower than current conditions at the dam site with significantly less variation as you move upstream.
- Although the area will be influenced by tidal movement, salt water is not anticipated to ascend upstream further than the current dam site, although future salinity monitoring should inform this assumption.
- The extent of the dam’s impact ends approximately 1.5 miles upstream which is just above the Railroad Bridge.
- Removal would lead to reduced flooding risk to buildings and property upstream of the dam.

### RECREATION

- Removal would enhance recreational opportunities such as fishing, boating, and birding which can add vitality to the downtown area and the Riverwalk.
- Potential fish passage and paddling restrictions at Railroad Bridge during extreme low flows were identified and would be addressed in future project design to mitigate impacts.
- The study identified a potential to increase eco-tourism through improved river-centric events.
- Four tributary confluences, two public canoe landings, and the IRWA dock area were evaluated. Dam removal would have minimal impacts on these areas.
- Improved paddling access at dam site would allow boating opportunities down the river into the estuary during most flow conditions, however paddling may be impacted during the driest times of year (akin to current conditions).

### SEDIMENT TRANSPORT AND POTENTIAL EROSION

A table of potential impacts and mitigation suggestions for each potential impact is provided in the full report.

- More study is recommended to assess the sediment accumulation upstream of the dam and assess the risk of bank and river channel erosion along the railroad embankment. As the system reverts to natural, pre-dam conditions there will be temporary river channel erosion in some tributaries as they enter the main portion of the river.
- Temporary sediment accumulation at Choate Bridge following removal is expected until the system equalizes during subsequent floods. It is recommended that deposition in the downstream channel be monitored following dam removal.
- Fine sediment that is released as a result of dam removal is likely to be dispersed by river flows and tidal fluctuations in the downstream channel.
- Prior studies have found the sediment upstream of the dam appears to be relatively clean and suitable for downstream release. Additional sediment testing would be required as part of future permitting efforts, if dam removal is advanced.
- To more accurately predict future upstream water levels, further investigation will be required to clarify the elevation and integrity of the bedrock that the dam is built upon, historically known as the “upper falls.” For this study, a conservative approach was used to model future conditions due to the uncertainty of the bedrock elevation and condition.

### POTENTIAL IMPACTS TO NEARBY BUILDINGS & OTHER INFRASTRUCTURE

- The study concluded that there is potential risk to one building which could be mitigated pending further investigation.
- Test pits determined river edge foundations are bearing on rock, competent soil, or piles low enough to remain submerged in a dam-removal scenario such that there is no risk to perimeter foundations.
- 2018 borings indicated that compressible soils composed of organic silt exist in the southeast corner of one building, raising the possibility of similar soils under two other building areas. If present, settlement of 1 to 1.5 inches is possible over 50 years due to the drying of soils.
- No borings were completed in the building interior, so the presence of compressible soils or timber pile foundation under southeastern corner interior columns beneath building is possible. Further study is necessary to confirm the subsurface conditions.
- The Town’s main sewer interceptor and trunk line are currently exposed along and under the river downstream of the dam and could be impacted by trees or other debris currently trapped by the dam. The Town is planning to shore up these pipes before the dam would be removed which would eliminate the risk to this infrastructure.

### CULTURAL RESOURCES

- The study recommends that there be a careful survey and documentation of any historic resources that may be revealed underwater if removal were to occur.
- Compliance with Section 106 of the National Historic Preservation Act will be required if dam removal is pursued, which may include archaeological survey, historic documentation, archival photography, construction monitoring, and possible historic mitigation.
- Removal provides an opportunity to increase tourism to downtown Ipswich and the study recommends the creation of an interpretative historical plaque commemorating the vibrant history of Ipswich Mills area.
- Sea run fish were a critical component of this cultural history and the site has Native American significance as a major fish trapping location.
- The study determined that the dam built in 1906 is not listed in the National Historic Register.

### TECHNICAL AND COST CONSIDERATIONS

The Technical Advisory Committee (TAC) is committed to assisting the Town in the decision-making process.

- There is currently significant state and federal funding available to remove dams and mitigate potential associated risks (such as those which may affect adjacent buildings and property). The Ipswich Mills Dam is a high priority dam for removal in New England and as such, there may be increasing regulatory and public pressure to remove this dam, including from upstream constituencies desirous of migratory fish restoration.
- Removal is estimated to cost about \$600,000, excluding possible mitigation to adjacent buildings. A probing study of the soil and supports under one nearby building is needed to determine the necessity and scope of mitigation.
- The dam currently is in need of \$36,000 in repairs and its next inspection is due in 2019. Removing the dam will eliminate this and future maintenance expenses.

### REMAINING TASKS

Significant additional public input would be required if dam removal were to be advanced by the Town. This process would include follow up scientific studies such as:

- Additional subsurface investigation of nearby building interior to determine if compressible soils or timber piles are present under supports and to inform the design of an appropriate mitigation system (if warranted).
- Additional sediment probing and characterization of the “Upper Falls” ledge, scour analysis at the upstream railroad bridge and along river bank near the railroad, and salinity measurements above and below the dam.

### NEXT STEPS & OUTREACH

- TAC members have suggested touring the recent Exeter New Hampshire downtown dam removal project site, given its close proximity and near perfect analog to the Ipswich Mills site.
- An initial public meeting presentation was held in December 2018 and additional outreach will take place.
- Initial public input on the project was sought at the December public meeting presentation. 58 people voted concerning whether or not they supported dam removal. 62% of respondents were generally in support of dam removal, 19% were generally concerned, and 19% did not feel fully informed.
- 66 people voted concerning what their biggest interest was in the project. 58% of respondents selected enhancing the ecological health of the river; 17% chose changes to the river upstream of the dam; 16% chose impacts on flooding, water quality, and/or quantity; 6% chose recreational opportunities; 2% chose historic and/or cultural resources; 2% chose public safety, dam liability, and maintenance costs; and none chose potential damage to nearby properties and infrastructure.